

WHAT IS CLAIMED IS:

1 1. An ink-jet recording apparatus comprising:

2 a recording head having a dot formation element array including
3 a plurality of dot formation elements arranged along a secondary scanning
4 direction;

5 a platen for holding a recording medium in position opposite the
6 recording head during a printing operation while the recording head is
7 caused to scan in a primary scanning direction;

8 a recording-medium feed roller disposed upstream of the recording
9 head;

10 an output roller disposed downstream of the recording head; and

11 a first hole which is formed in an area of the platen opposite
12 a downstream portion of the dot formation element array with respect to
13 the secondary scanning direction and which guides the ink that has been
14 discarded outside a top end of the recording medium when data are recorded
15 on the recording medium without leaving a margin on the top end of the
16 recording medium.

1 2. An ink-jet recording apparatus comprising:

2 a recording head having a dot formation element array including
3 a plurality of dot formation elements arranged along a secondary scanning
4 direction;

5 a platen for holding a recording medium in position opposite the
6 recording head during a printing operation while the recording head is
7 caused to scan in a primary scanning direction;

8 a recording-medium feed roller disposed upstream of the recording
9 head;

10 an output roller disposed downstream of the recording head; and
11 *Sub* a second hole which is formed in an area of the platen opposite
12 *pt 1* an upstream portion of the dot formation element array with respect to
13 the secondary scanning direction, the platen guiding to the second hole
14 the ink that has been discarded outside a top end of the recording medium
15 when data are recorded on the recording medium without leaving a margin
16 on the top end of the recording medium.

1 3. The ink-jet recording apparatus as defined in claim 1, wherein
2 a second hole is formed in an area of the platen opposite an upstream
3 portion of the dot formation element array with respect to the secondary
4 scanning direction, and the platen guides to the second hole the ink that
5 has been discarded outside a top end of the recording medium when data
6 are recorded on the recording medium without leaving a margin on the top
7 end of the recording medium.

1 4. The ink-jet recording apparatus as defined in claim 3, wherein
2 the recording head is arranged so as to be able to selectively perform
3 a standard interlaced recording operation for recording data by actuation
4 of all the dot formation elements of the dot formation element array,
5 and a limited interlaced recording operation for limitedly actuating a
6 portion of the dot formation elements, through use of a dot drive control
7 section, and the limited interlaced recording operation is performed when

8 the top end of the recording medium is situated at the first hole and
9 when the bottom end of the recording medium is situated at the second
10 hole.

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1 5. The ink-jet recording apparatus as defined in claim 3, wherein,
2 in the area of the surface of the platen opposite the dot formation array,
3 there are located flat tops which come into contact with the recording
4 medium and support the recording medium from below.

1 6. The ink-jet recording apparatus as defined in claim 3, wherein,
2 in a downstream position outside the area of the surface of the platen
3 opposite the dot formation array, there are located flat tops which come
4 into contact with the recording medium and support the recording medium
5 from below.

1 7. The ink-jet recording apparatus as defined in claim 3, wherein
2 an ink-absorbing material is provided within each of the first and second
3 holes.

1 8. The ink-jet recording apparatus as defined in claim 3, wherein
2 a water repellent net is provided so as to cover an opening of each of
3 the first and second holes, and ink-absorbing material is provided in
4 each hole so as to be in contact with the hole.

1 9. The ink-jet recording apparatus as defined claim 3, wherein a

2 reclosable closure is attached to the opening of each of the first and
3 second holes, and the closure is opened when data are recorded on the
4 recording medium without leaving a margin on either the top or bottom
5 end of the recording medium, the closure being closed when data are
6 recorded on the recording medium while leaving a margin.

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1 10. The ink-jet recording apparatus as defined claim 9, wherein the
2 closure has a pivot located below the opening of corresponding hole and
3 is pivotally opened or closed by being pivoted around the pivot.

1 11. A recording method for recording data on a recording medium without
2 leaving a margin through use of an ink-jet recording apparatus, the
3 apparatus including:

4 a recording head having a dot formation element array including
5 a plurality of dot formation elements arranged along a secondary scanning
6 direction;

7 a platen which holds a recording medium in position opposite the
8 recording head during a printing operation while the recording head is
9 caused to scan in a primary scanning direction;

10 a recording-medium feed roller disposed upstream of the recording
11 head; and

12 an output roller disposed downstream of the recording head, wherein
13 ink is squirted while the end portion of the recording medium is
14 situated within the range of the dot formation element array in the
15 secondary scanning direction, and a portion of the ink is discarded into

16 a hole locally formed in the area of the surface of the platen opposite
17 the end portion of the recording medium situated thereat, to thereby
18 record data on the recording medium without leaving a margin on the edge
19 of the recording medium.

1 12. The recording method as defined in claim 11, wherein the recording
2 head performs an interlaced recording operation for actuating one of the
3 dot formation elements located at a position close to the end portion
4 of all the dot formation elements when data are recorded on the end portion
5 of the recording medium without leaving a margin, or an interlaced
6 recording operation for recording data on the recording medium by
7 actuation of all dot formation elements when the data are recorded in
8 a record region other than the end portion.

1 13. An ink-jet recording apparatus comprising:
2 an ink-jet recording head on which a plurality of dot formation
3 elements are arranged along a secondary scanning direction and which is
4 reciprocally moved in a primary scanning direction;
5 a platen which is disposed opposite the recording head and holds
6 a recording medium in position by supporting the recording medium from
7 below when data are recorded, by means of the recording head, on the
8 recording medium to be intermittently transported in the secondary
9 scanning direction;
10 a control section for controlling, on the basis of recorded data,
11 intermittent transportation of the recording medium in the secondary

12 scanning direction, reciprocal movement of the recording head in the
13 primary scanning direction, and the squirting of ink from the recording
14 head, the control section having:

15 *Supp* a first operation mode in which a recording operation is
16 performed by means of expanding recorded data within a record region
17 inside the right and left sides of the employed recording medium of
18 predetermined size;

19 a second operation mode in which a recording operation is
20 performed by means of expanding the recorded data of the same within a
21 record region outside either side of the employed recording medium of
22 the same size and inside an outer edge of the ink-receiver open hole;
23 and

24 ink-receiver open holes which are formed in the areas of the platen
25 corresponding to the right and left sides of one type of recording medium
26 of predetermined size or the right and left sides of two or more types
27 of recording media of predetermined sizes, from among the recording media
28 to be transported over the platen in the secondary scanning direction,
29 the holes being formed so as to extend beyond the respective right and
30 left sides of the employed recording medium and formed to longitudinally
31 extend beyond the range of the dot formation elements in the secondary
32 scanning direction,

33 wherein in a case where data are recorded on the recording medium
34 without leaving a margin on either side of the recording medium, the second
35 operation mode is performed.

1 14. An ink-jet recording apparatus comprising:

2 an ink-jet recording head on which a plurality of dot formation
3 elements are arranged along a secondary scanning direction and which is
4 reciprocally moved in a primary scanning direction;

5 *Sub 2* a platen which is disposed opposite the recording head, has a flat
6 upper surface on which a plurality of protuberances protruding the same
7 distance are formed at predetermined intervals in the primary scanning
8 direction, and holds the recording medium in position by supporting the
9 recording medium from below through use of flat tops of the plurality
10 of protuberances when data are recorded, by means of the recording head,
11 on the recording medium to be intermittently transported in the secondary
12 scanning direction;

13 a control section for controlling, on the basis of recorded data,
14 intermittent transportation of the recording medium in the secondary
15 scanning direction, reciprocal movement of the recording head in the
16 primary scanning direction, and the squirting of ink from the recording
17 head, the control section having:

18 a first operation mode in which a recording operation is
19 performed by means of expanding recorded data within a record region
20 inside the right and left sides of the employed recording medium of
21 predetermined size;

22 a second operation mode in which a recording operation is
23 performed by means of expanding the recorded data of the same within a
24 record region outside either side of the employed recording medium of
25 the same size and inside an outer edge of the ink-receiver open hole;

26 ink-receiver open holes which are formed in the flat areas of the
27 upper surface of the platen in which the protuberances are not formed,
28 as well as in the areas of the upper surface of the platen corresponding
29 to the right and left sides of one type of recording medium of
30 predetermined size or the right and left sides of two or more types of
31 recording media of predetermined sizes, from among the recording media
32 to be transported over the platen in the secondary scanning direction,
33 the holes being formed so as to extend beyond the respective right and
34 left sides of the respective recording media and formed to longitudinally
35 extend beyond the range of the dot formation elements in the secondary
36 scanning direction,

37 wherein in a case where data are recorded on the recording medium
38 without leaving a margin on either side of the recording medium, the second
39 operation mode is performed.

1 15. The ink-jet recording apparatus as defined in claim 13, wherein
2 the recording region for the second mode is set to be wider than the width
3 of the recording medium by 4.5 mm to 5.5 mm.

1 16. The ink-jet recording apparatus as defined in claim 13, wherein
2 in both the first and second operation modes, the control section assumes,
3 as a speed at which the recording head reciprocally travels in the primary
4 scanning direction, a single acceleration gradient at which the recording
5 head is to shift from a stationary state to a constant-speed state and
6 a single deceleration gradient at which the recording head is to shift

7 from the constant-speed state to the stationary state, and a travel
8 distance attained by the recording head of the second operation mode in
9 the constant-speed state is longer than a travel distance attained by
10 the recording head of the first operation mode in the constant-speed state,
11 and travel distance in an acceleration side and travel distance in a
12 deceleration side are substantially equal.

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1 17. The ink-jet recording apparatus as defined in claim 13, wherein
2 an ink-absorbing material is provided in each of the ink-receiver open
3 holes, and the ink-absorbing material is situated within corresponding
4 ink-receiver open hole such that the upper surface of the ink-absorbing
5 material is located in the vicinity of the opening of the through hole
6 opposite the recording head.

1 18. The ink-jet recording apparatus as defined in claim 14, wherein
2 an ink-absorbing material is provided in each of the ink-receiver open
3 holes, and the ink-absorbing material is situated within corresponding
4 ink-receiver open hole such that the upper surface of the ink-absorbing
5 material is located in the vicinity of the opening of the through hole
6 opposite the recording head.

1 19. The ink-jet recording apparatus as defined in claim 17, wherein
2 a first removal stopper is provided along the edge of the opening of each
3 of the ink-receiver open holes disposed opposite the recording head, for
4 preventing removal of the ink-absorbing material toward the recording

5 head.

1 20. The ink-jet recording apparatus as defined in claim 19, wherein
2 the first removal stopper is formed into a step provided along the edge
3 of the opening of each of the ink-receiver open holes disposed opposite
4 the recording head.

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1 21. The ink-jet recording apparatus as defined in claim 13, wherein
2 each of the ink-receiver open holes penetrates through the platen from
3 the side opposite the recording head to the other side.

1 22. The ink-jet recording apparatus as defined in claim 21, wherein
2 second removal stoppers are provided in each of the ink-receiver open
3 hole for preventing removal of the ink-absorbing material away from the
4 recording head.

1 23. The ink-jet recording apparatus as defined in claim 22, wherein
2 the second removal stoppers are formed into raised long lines extending
3 along the interior surface of the ink-receiver open hole in the direction
4 of penetration.

1 24. The ink-jet recording apparatus as defined in claim 22, wherein
2 the second removal stoppers are each formed into a step provided along
3 the edge of the corresponding opening of the ink-receiver open hole
4 disposed opposite the recording head.

1 25. The ink-jet recording apparatus as defined in claim 13, wherein
2 a tilt section is provided in each of the ink-receiver open holes at an
3 angle from the recording head to the other side so as to maintain the
4 through state of the through hole, and an ink-absorbing material is laid
5 on the tilt section.

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1 26. The ink-jet recording apparatus as defined in claim 13, wherein
2 each of the ink-receiver open holes is formed in the form of a through
3 hole, and a tilt section is provided in the through hole at an angle from
4 the recording head to the other side so as to maintain the through state
5 of the through hole, a plurality of ribs being provided on the tilt section
6 at intervals such that holes are formed in the tilting direction, and
7 top surfaces of the ribs being formed so as to be lower than the opening
8 of the through hole.

1 27. The ink-jet recording apparatus as defined in claim 3, further
2 comprising:

3 a control section for controlling, on the basis of recorded data,
4 intermittent transportation of the recording medium in the secondary
5 scanning direction, reciprocal movement of the recording head in the
6 primary scanning direction, and the squirting of ink from the recording
7 head, the control section having:

8 a first operation mode in which a recording operation is
9 performed by means of expanding recorded data within a record region
10 inside the right and left sides of the employed recording medium of

11 predetermined size;

12 a second operation mode in which a recording operation is
13 performed by means of expanding the recorded data of the same within a
14 record region outside either side of the employed recording medium of
15 the same size and inside an outer edge of the corresponding ink-receiver
16 open hole; and

17 *Sub B* ink-receiver open holes which are formed in the areas of the platen
18 corresponding to the right and left sides of one type of recording medium
19 of predetermined size or the right and left sides of two or more types
20 of recording media of predetermined sizes, from among the recording media
21 to be transported over the platen in the secondary scanning direction,
22 the holes being formed so as to extend beyond the respective right and
23 left sides of the respective recording media and formed to longitudinally
24 extend beyond the range of the dot formation elements in the secondary
25 scanning direction,

26 wherein in a case where data are recorded on the recording medium
27 without leaving a margin on either side of the recording medium, the second
28 operation mode is performed.

1 28. An ink-jet recording apparatus comprising:

2 a recording head having a dot formation element array including
3 a plurality of dot formation elements arranged along a secondary scanning
4 direction;

5 a platen for holding a recording medium in position opposite the
6 recording head during a printing operation while the recording head is

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7 caused to scan in a primary scanning direction;
8 a recording-medium feed roller disposed upstream of the recording
9 head;
10 an output roller disposed downstream of the recording head;
11 a flat top for supporting the recording medium from below which
12 is provided in the area of the platen surface opposite the dot formation
13 element array; and
14 a center hole formed in substantially the center of the flat top
15 with respect to the direction in which the recording medium is to be
16 transported, wherein, when data are recorded on the recording medium
17 without leaving a margin on the top end and/or the bottom end of the
18 recording medium, the ink discarded outside the top end or the bottom
19 end is guided to the center hole.

1 29. An ink-jet recording apparatus comprising:
2 a recording head having a plurality of dot formation element arrays
3 for respective colors and arranged sequentially along a secondary
4 scanning direction, each dot formation element array including a
5 plurality of dot formation elements arranged along the secondary
6 scanning direction;
7 a platen for holding a recording medium in position opposite the
8 recording head during a printing operation while the recording head is
9 caused to scan in a primary scanning direction;
10 a recording-medium feed roller disposed upstream of the recording
11 head;

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12 an output roller disposed downstream of the recording head;
13 first holes formed in the positions of the surface of the platen
14 opposite downstream portions of the respective dot formation element
15 arrays of respective colors; and
16 second holes formed in the positions of the surface of the platen
17 opposite upstream portions of the respective dot formation element arrays
18 of the respective colors,
19 wherein when data are recorded on the recording medium without
20 leaving a margin on the top end of the recording medium, the ink squirted
21 from the dot formation element arrays of respective colors outside the
22 top end is guided to the first holes, and
23 wherein when data are recorded on the recording medium without
24 leaving a margin on the bottom end of the recording medium, the ink
25 squirted from the dot formation element arrays of respective colors
26 outside the bottom end is guided to the second holes.

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1 30. The ink-jet recording apparatus as defined in claim 27, wherein
2 the recording head is arranged so as to be able to selectively perform
3 a standard interlaced recording operation for recording data by actuation
4 of all the dot formation elements of the dot formation element array,
5 and a limited interlaced recording operation for limitedly actuating a
6 portion of the dot formation elements, through use of a dot drive control
7 section, and the limited interlaced recording operation is performed when
8 the top end of the recording medium is situated at the first holes and
9 when the bottom end of the recording medium is situated at the second

10 holes.

31. The ink-jet recording apparatus as defined in claim 28, wherein the recording head is arranged so as to be able to selectively perform a standard interlaced recording operation for recording data by actuation of all the dot formation elements of the dot formation element array, and a limited interlaced recording operation for limitedly actuating a portion of the dot formation elements, through use of a dot drive control section, and the limited interlaced recording operation is performed when the top end or the bottom end of the recording medium is situated at the center hole.

32. The ink-jet recording apparatus as defined in claim 29, wherein the recording head is arranged so as to be able to selectively perform a standard interlaced recording operation for recording data by actuation of all the dot formation elements of the dot formation element array, and a limited interlaced recording operation for limitedly actuating a portion of the dot formation elements, through use of a dot drive control section, and the limited interlaced recording operation is performed when the top end of the recording medium is situated at the first holes corresponding to the plurality of dot formation element arrays of respective colors and when the bottom end of the recording medium is situated at the second holes corresponding to the plurality of dot formation element arrays of respective colors.